# EXECUTIVE SUMMARY

The California Coronary Artery Bypass Graft (CABG) Outcomes Reporting Program (CCORP) is the largest public reporting program on CABG surgery outcomes in the United States with 32,586 isolated CABG surgeries reported in 2005-2006.

The *California Report on Coronary Artery Bypass Graft Surgery, 2005-2006 Hospital and Surgeon Data* presents findings from analyses of data collected from California's 121 state-licensed hospitals where 284 surgeons performed adult isolated coronary artery bypass graft (CABG) surgery[1] during 2005 and 2006.

The report uses risk-adjusted operative mortality to evaluate hospital and surgeon performance. Risk adjustment is a statistical technique that allows for fair comparison of hospital or surgeon outcomes even though some hospitals and surgeons have sicker patients than average. Operative mortality includes all deaths that occur during the hospitalization in which the CABG surgery was performed (regardless of length of stay) and any deaths within 30 days after the surgery, no matter where the deaths occurred.

This report provides hospital-level information on internal mammary artery (IMA)[2] usage for 2006, an additional measure of surgical quality. This report also examines the relationship between the number of surgeries that hospitals and surgeons perform and their mortality rates.

Key findings from this report are:

- There were 347 operative deaths among 15,647 isolated CABG surgeries in 2006. The operative mortality rate for isolated CABG surgery in California was 2.22% for 2006, compared to 3.08% for 2005 (522 operative deaths among 16,939 isolated CABG surgeries). Nationally, the Society of Thoracic Surgeons (STS) reported an operative mortality rate of 2.4% for 2005 and 2.3% for 2006.[3] STS hospital participation is voluntary and the group does not verify hospital reported deaths by linking with state vital statistics death files, as CCORP does.

- There was significant variation in hospital-level CABG surgery outcomes after adjusting for patients' pre-operative health conditions. Hospital risk-adjusted mortality rates in 2006 ranged from 0% to 10.38%. However, 114 of 121 hospitals (94.2%) performed at an expected rate when compared to the state's overall mortality rate.

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[1] Isolated CABG surgery refers to heart bypass surgery without other major surgery, such as heart or lung transplantation, valve repair, etc., performed concurrently with the bypass procedure. See the CCORP Web site for a complete definition of isolated CABG. http://www.oshpd.ca.gov/HID/SubmitData/CCORP_CABG/index.html

[2] The internal mammary artery (IMA) is an artery that supplies blood to the front chest wall and the breasts. It is a paired artery, with one running on each side of the inner chest. Evidence shows that the IMA, when grafted to a coronary artery, is less susceptible to obstruction over time and remains fully open longer than vein grafts.

[3] Society of Thoracic Surgeons: 2nd Harvest 2008 Adult Cardiac Surgery Database Executive Summary, 03/31/2008. http://www.sts.org/sections/stsnationaldatabase/publications/executive/article.html

- For 2006, 5 of the 121 hospitals performed significantly **"Better"** than the state average, and 2 hospitals performed significantly **"Worse"** than the state average. These hospitals are presented in the following table in alphabetical order:

### Hospitals with "Better" Performance Ratings, 2006

| Hospital | Region |
|---|---|
| Doctors Medical Center - Modesto Campus | Central California |
| Kaiser Foundation Hospital (Geary San Francisco) | San Francisco Bay Area & San Jose |
| Kaiser Foundation Hospital (Sunset) | Greater Los Angeles |
| Mercy General Hospital | Sacramento Valley & Northern California |
| Pomona Valley Hospital Medical Center | Inland Empire, Riverside & San Bernardino |

### Hospitals with "Worse" Performance Ratings, 2006

| Hospital | Region |
|---|---|
| San Joaquin Community Hospital | Central California |
| Tri-City Medical Center | Greater San Diego |

- Hospital risk-adjusted mortality rates and performance ratings were also produced for 2005-2006, the same period as the surgeon-level results, and are included later in this report.

- There was wide variation in surgeon-level CABG surgery outcomes after adjusting for patients' pre-operative health conditions. Surgeon overall risk-adjusted mortality rates in 2005-2006 ranged from 0% to 100% (one surgeon performed CABG on only one patient, who died), combined across all facilities where they operate. However, 275 of the 284 surgeons (96.8%) performed within the expected range compared to the state's average mortality rate.

- For 2005-2006, one surgeon's overall performance was significantly **"Better"** than the state average, and eight surgeons' overall performance was significantly **"Worse"** than the state average. These surgeons are presented in the following table in alphabetical order:

**Surgeons with " Better" Performance Ratings Overall, 2005-2006**

| Surgeon | Region |
|---|---|
| Gharavi, Mohammad A. | San Fernando Valley, Antelope Valley, Ventura & Santa Barbara |

**Surgeons with "Worse" Performance Ratings Overall, 2005-2006**

| Surgeon | Region |
|---|---|
| Derrick, Marvin J. | Central California |
| Dhar, Naveen | Orange County |
| Eugene, John | Orange County and Greater Los Angeles |
| Gunupati, Venkata C. | Greater Los Angeles |
| Kriett, Jolene M. | Greater San Diego |
| Lee, Sang H. | San Francisco Bay Area & San Jose |
| Tobin, Hugh M. | Central California |
| Young, John A. | Greater San Diego |

- Surgeon ratings are also provided separately for each hospital where they operated. These ratings take into consideration both surgeon and hospital-specific factors.

Other major findings in this report include:

- Internal Mammary Artery (IMA) usage is a nationally endorsed measure of quality for heart bypass surgery. Most patients are able to receive an IMA bypass. Very low hospital utilization rates may be associated with poorer care. Clinical research shows that IMA grafts used in CABG surgery stay open longer and increase patient survival. Since CCORP first reported IMA usage by hospitals for 2003-2004, the overall California IMA usage rate has increased from 89.6% to 93.3% in 2006. In 2003-2004, eight hospitals were noted as having significantly lower IMA usage rates. In 2006, only three hospitals had significantly lower IMA usage rates. These hospitals are presented in the following table in alphabetical order:

**Hospitals with "Low" IMA Performance Ratings, 2006**

| Hospital | Region |
|---|---|
| Lancaster Community Hospital | San Fernando Valley, Antelope Valley, Ventura & Santa Barbara |
| Sutter Medical Center of Santa Rosa | San Francisco Bay Area & San Jose |
| USC University Hospital | Greater Los Angeles |

- A small but significant association was found between a hospital's CABG surgery volume (both isolated and total CABG surgery) and isolated CABG surgery operative mortality. This association is primarily explained by the lower operative mortality rates among a few very high volume hospitals. Similarly, a small but significant association was found between a surgeon's CABG surgery volume (both isolated and total CABG surgery volume) and isolated CABG surgery operative mortality. This association is primarily explained by the higher operative mortality rates among lower volume (less than 50 cases per year) surgeons. Most studies have found that hospitals and surgeons that perform more CABG surgeries have better outcomes, but other research, along with some prior OSHPD studies, have not found evidence of such a relationship.

- In California, utilization of percutaneous coronary interventions (PCIs), such as angioplasty with stent insertion, increased by 22.4% from 1997 to 2007, peaking in 2005 when total PCI volume reached 60,709. During the same period, the number of isolated CABG surgeries dropped by 46.6%. The observed in-hospital mortality rate for isolated CABG surgeries decreased from 3.08% in 1997 to 1.90% in 2007 while the same mortality rate for PCIs generally remained stable (1.70% in 1997 and 1.75% in 2007). A more comprehensive approach to assessing the quality of revascularization procedures in California would include reporting the outcomes of PCI providers.